

# Jennifer Elizabeth Gerbi

Argonne National Laboratory  
Bldg 200, Rm D-125  
Argonne, IL 60439  
(630)-252-7979  
gerbi@anl.gov

Residence:  
5516 King Arthur Ct. Apt 11  
Westmont, IL 60559  
(630)-927-5106 (cell)

**Vita:** Born December 14, 1971 (U.S. Citizen)

**Goal:** Academic/Research position including a comprehensive thin film vapor deposition program. Physics, materials science, and inter-disciplinary instruction both at the undergraduate and graduate levels.

## **Education:**

Ph.D. (Materials Science) University of Illinois, Urbana-Champaign, Illinois. May 2001  
M.S. (Physics) University of Virginia, Charlottesville, Virginia. August 1995  
B.A. (Physics) Bard College, Annandale-on-Hudson, New York. May 1993

## **Research Experience:**

### **Postdoctoral Research Associate**

*June 2001-Present*

Argonne National Laboratory, Argonne, Illinois. Supervisors: Dr. John Carlisle, Dr. Orlando Auciello, Dr. Mike Pellin

Development of Ultra-Nanocrystalline Diamond (UNCD) microwave CVD thin film growth processes, study of electronic and structural film properties, and initial devices. Development of UNCD in-situ gas doping process and substrate seeding methods. Achieved the first n-type devices realized with any diamond films. Characterization methods: Raman scattering, FTIR, ellipsometry and other optical techniques, X-TEM, electrical characterization techniques, near-edge x-ray fine structure (NEXAFS) spectroscopy, AFM, XRD. Group received the 2003 R&D 100 Award.

Active collaborations include Frederick Seitz Materials Research Laboratory (UIUC), Dr. Robert Hamers and Dr. Robert Carpick (U Wisconsin-Madison), Dr. Millicent Firestone and Dr. Peter Zapol (ANL), Dr. Bruce Alphenaar (U of Louisville), Dr. Michael Dugger (Sandia), INTEL, Motorola, Second Sight, Delphi, IPlas.

**2003 DCG LDRD proposal awarded:** "Novel Thin-Film Diamond Electronics" (J.E. Gerbi, P.I.) (\$190K)

**Patent under review:** "Improved Seeding Technique For Thin-Film Diamond Nucleation",

J. E. Gerbi, ANL (2003)

### **Graduate Fellow and Research Assistant**

*August 1995-May 2001*

University of Illinois at Urbana-Champaign, Urbana, Illinois. Dr. John R. Abelson.

Study of reactive magnetron sputtered high-quality thin film silicon deposited at low temperatures. Focus: Control of morphology and structure via controlled particle bombardment during deposition, including both neutral and ionized species. Low-temperature direct polycrystalline Si deposition was achieved directly on glass. Special interests in medium range order of amorphous silicon as measured with novel microscopy techniques (fluctuation microscopy), and the grain structure of microcrystalline and polycrystalline silicon. Collaborations with Dr. Murray Gibson (ANL), Dr. Paul Voyles (NEC/Bell Laboratories/U Wisconsin-Madison), Dr. Mike Treacy (NEC), and Dr. Brent Heuser (UIUC).

**Additional Responsibilities:** Computer administrator. Lab Supervisor. Occasional guest lectures (1996, 1997). Training of new students. Assistance with proposals and represented advisor at NREL contractors meeting. Co-Taught Advanced Thin Films Course (2001).

**Research Assistant**

1994-1995 University of Virginia, Charlottesville, Virginia. Dr. Ken Nelson.

Conducted at the Fermi National Accelerator Laboratory, Batavia, Illinois.

*Topic:* Design of Wire Chamber Detectors for Fermilab E871: CP violation through hyperon decay.

1993-1994 University of Virginia, Charlottesville, Virginia, Professor Richard Sealock

*Topic:* Compilation of delta-production data in various nuclei.

**SERS (Science and Engineering Research Semester) participant**

*Spring, 1993* Argonne National Laboratory, Argonne, IL Dr. Roy Holt

*Topic:* The Optically Pumped Spin Polarized Deuterium Gas Target: Measurement of Nuclear Polarization.

**REU (Research Experience for Undergraduates) participant**

*Summer, 1992* College of William and Mary, Williamsburg, Virginia. Dr. Stan Majewski

Research performed at CEBAF (at the Jefferson Laboratory), Newport News, Virginia

*Topic:* Development of resistive Kapton straw wire tube drift particle detector with external strip electrode readout.

**Teaching Experience:**

2001 UIUC: MatSe 464, Materials Science of Thin Film Growth From the Vapor Phase

(co-instructor with J. R. Abelson) (Graduate Materials Science)

1992 UVa: Grader, Electricity and Magnetism (Undergraduate Physics)

1991 UVa: Grader, Mechanics (Undergraduate Physics)

1990-1991 UVa: Teaching Assistant, Physics Laboratory for Engineers (Undergraduate Physics)

1989-1990 UVa: Teaching Assistant, Physics Laboratory for Engineers (Undergraduate Physics)

**Honors/Societies:**

2003 B. A. Scott Prize Best Student Poster (Gordon Conference- Chem. Elect. Mats.)

2003 Invited -- American Chemical Society (ACS) GLRM talk

2002 Electronic Materials and Processing Division (EMPD) Postdoctoral Award (AVS)

2002 Invited -- Argonne Division of Materials Science Postdoctoral Lecture (ANL)

2000 Racheff Award (Dept. of Materials Science, UIUC)

2000 AVS Nellie Yeoh Whetten Award (AVS)

2000 MRS Graduate Student Award (MRS)

1998-1999 Frederic T. & Edith F. Mavis Memorial Fellowship (UIUC)

1995-2000 SURGE Fellow (UIUC)

1993-1995 Consistently highest student ratings for class sections (University of Virginia)

1989-1992 EEC Fellow, Helena Rubenstein Fellow, Gustave Aufricht Memorial Scholarship,

Hudson River Area Scholarship, Honor List (Bard College)

1998-present AVS member, MRS member

**Activities:**

2003: Invited speaker at "Futures Unlimited" conference

2002, 2003 Women in Science Day at Argonne Participant

2001 Illinois Junior Academy of Science regional science fair judge

2000 Accepted to SEESPN conference at UIUC

2000 Women in Science and Engineering conference at UIUC

1996-2001 Member of UIUC Graduate Chorale

1997 MRS student chapter web page designer/departmental representative

1996-1997 Co-organizer for graduate student recruiting at UIUC

1993 Co-organizer for Women in Science Day at Argonne (>350 local high school students attending)

## Publication List: J. E. Gerbi

J. E. Gerbi, O. Auciello, J. Birrell, D. M. Gruen, J. A. Carlisle, "Behavior of Metal Contacts on Ultrananocrystalline Diamond", *Appl. Phys. Letts.* **83**, 2001 (2003)

J. E. Gerbi, P.M. Voyles, M. M. J. Treacy, J. M. Gibson, and J. R. Abelson, "Medium Range Order in Amorphous Silicon Films as a Function of Low-Energy Particle Bombardment During Growth", *Appl. Phys. Letts.* **82**, 3665 (2003)

J. E. Gerbi and J.R. Abelson, "Enhancement of Crystallinity Using Light Particle Bombardment of Silicon Thin Films During Reactive Magnetron Sputter Deposition", in prep., (2003)

J. E. Gerbi, "Selective Seeding of Ultrananocrystalline Diamond", in prep., (2003)

J. E. Gerbi, O. Auciello, D. M. Gruen, J. A. Carlisle, "Thin-Film N-type Diamond MESFET", in prep., (2003)

J. E. Gerbi and J.R. Abelson, "Microcrystalline Silicon Deposited by Direct Current Reactive Magnetron Sputtering", *J. Appl. Phys.* **89**, 1463 (2001)

W. Yang, O. Auciello, J. E. Butler, W. Cai, J. A. Carlisle, J. E. Gerbi, D. M. Gruen, T. Knickerbocker, T. L. Lasseter, J. N. Russell, Jr., L. M. Smith, R. J. Hamers "DNA-Modified Nanocrystalline Diamond Thin Films as High-Stability, High-Selectivity Biologically Active Substrates", *Nature Materials* **1**, 253-257 (2002)

W. Yang, O. Auciello, J. E. Butler, W. Cai, J. A. Carlisle, J. E. Gerbi, D. M. Gruen, J. N. Russell, Jr., L. M. Smith, R. J. Hamers "Direct Electrical Detection Of DNA Hybridization On DNA-Modified Nanocrystalline Diamond Thin Films", ECS proceedings, in press (2003)

J. Birrell, J. E. Gerbi, J. A. Carlisle , O. Auciello, D. M. Gruen, and J. M. Gibson, "Bonding Structure in Nitrogen Doped Ultrananocrystalline Diamond", *Journ. Appl. Phys.*, **93**, 5606 (2003)

P.M. Voyles, J.E. Gerbi, M.M.J. Treacy, J.M. Gibson, and J.R. Abelson, "Increased Medium-Range Order in Amorphous Silicon with Increased Substrate Temperature", *Journ. Non-Cryst. Solids* **293**, 45 (2001)

P.M. Voyles, J.E. Gerbi, M.M.J. Treacy, J.M. Gibson, and J.R. Abelson, "Absence of an Abrupt Phase Change From Polycrystalline to Amorphous in Silicon With Deposition Temperature", *Phys. Rev. Letts.* **86**, 5514 (2001)

Majewski S, Gerbi J, Kross B, Weisenberger A, Baker K. Second coordinate readout in resistive straw drift tubes. *Nuclear Instruments & Methods in Physics Research Section A* **348**, no.2-3, (1994)

### Conference Proceedings:

W. Yang, O. Auciello, J. E. Butler, W. Cai, J. A. Carlisle, J. E. Gerbi, D. M. Gruen, T. Knickerbocker, T. L. Lasseter, J. N. Russell, Jr., L. M. Smith, R. J. Hamers "Preparation and Electrochemical Characterization of DNA-modified Nanocrystalline Diamond Films", *MRS Proc.* **737**, F4-4-1 (2003)

H.D. Espinosa, B. Peng, K.-H. Kim, B.C. Prorok, N. Moldovan, X.C. Xiao, J.E. Gerbi, J. Birrell, O. Auciello, J.A. Carlisle, D.M. Gruen, and D.C. Mancini "Mechanical Properties of Ultrananocrystalline Diamond Thin Films for MEMS Applications", MRS Proc. **741**, J9-2, (2003)

J.E. Gerbi and J.R. Abelson, "Role Of Structure In The Staebler-Wronski Effect: Control Of Medium Range Order In Amorphous Si Via Ion Bombardment", Photovoltaics for the 21st Century, V. K. Kapur, R. D. McConnell, D. Carlson, G. P. Caesar, A. Rohatgi, J. Smith, eds. ECS Spring 2001 Conf. Proc., Washington, DC, 379 (2001)

J.E. Gerbi, P.M. Voyles, M. M. J. Treacy, J. M. Gibson, W. Chen, B. J. Heuser, J. R. Abelson, "Control of Medium Range Order in Amorphous Silicon via Ion and Neutral Bombardment" MRS Proc. **664**, A2731 (2001)

J.E. Gerbi and J.R. Abelson, "Microstructural Control Of Thin Film Si Using Low Energy, High Flux Ions in Reactive Magnetron Sputter Deposition" MRS Proc. **609** (2000)

J. E. Gerbi and J.R. Abelson, "Enhanced Crystallinity of Microcrystalline Silicon using Deuterium in Low Temperature Reactive Magnetron Sputter Deposition" MRS Proc. **507**, 429 (1998)

**Contributed Presentations: 2002-2003 (including future accepted with times noted):**

- 2003 MRS Fall Meeting** "Nanoscale Structure and Electronic Characteristics of Highly Conductive N-type Ultrananocrystalline Diamond" (*Tues, December 2<sup>nd</sup>, 3:00 PM*)
- 2003 AVS Fall Meeting** "Highly Conductive N-type Ultrananocrystalline Diamond: Materials Properties and Devices", J. E. Gerbi, O. Auciello, J. Birrell, S. Curat, D. M. Gruen, R. B. Jackman, O. A. Williams, and J. A. Carlisle *EM-WeA3 (Wed, November 5<sup>th</sup>, 2:40PM)*
- 2003 AVS Fall Meeting** "Nanotribological Properties of Ultrananocrystalline Diamond", D. S. Grierson, A. V. Sumant, J. E. Gerbi, J. A. Carlisle, O. Auciello, R. W. Carpick (*Wed, November 5<sup>th</sup>, 2:20 PM*)
- 2003 AVS Fall Meeting** "Engineering the Surface Properties of Ultrananocrystalline Diamond for High-Performance MEMS Devices", A. V. Sumant, D. S. Grierson, J. E. Gerbi, J. A. Carlisle, O. Auciello, R. W. Carpick (*Tues, November 4<sup>th</sup>, 9:00 AM*)
- 2003 Diamond 14<sup>th</sup> European Conf.** "N-type Conduction Within Ultrananocrystalline Diamond Films", O. A. Williams, S. Curat, J. E. Gerbi, D. M. Gruen, R. B. Jackman (*Monday, September 8<sup>th</sup>, Session 5*)
- 2003 ACS GLRM** "Ultrananocrystalline Diamond: Role in Nanotechnology", J. E. Gerbi
- 2003 AVS Surface Science** "Surface Studies on Ultrananocrystalline Diamond: Relevance for High-Performance MEMS", A. V. Sumant, D. Grierson, J. E. Gerbi, J. A. Carlisle, O. Auciello, R. W. Carpick
- 2003 MRS Spring Meeting** "Mechanical and Tribological Properties of Ultrananocrystalline Diamond Films Relevant to MEMS", O. Auciello, B. Peng, B. Prorok, H. D. Espinosa, X. Xiao, J. E. Gerbi, J. Birrell, J. A. Carlisle, M. T. Dugger
- 2002 MRS Fall Meeting** "N-Type Ultrananocrystalline Diamond as a Novel Electronic Material", J. E. Gerbi, B. W. Alphenaar, O. Auciello, J. Birrell, J. A. Carlisle, D. M. Gruen, X. Xiao
- 2002 MRS Fall Meeting** "Low Temperature Deposition of Ultrananocrystalline Diamond Films", X. Xiao, J. Birrell, S. Trasobares, J. W. Elam, J. E. Gerbi, O. Auciello, D. M. Gruen, J. A. Carlisle
- 2002 MRS Fall Meeting** "Electronic Structure of Grain Boundaries in Nitrogen-Doped Ultrananocrystalline Diamond", J. Birrell, O. Auciello, J. E. Gerbi, J. M Gibson, J. A. Carlisle
- 2002 AVS Fall Meeting** "N-type Diamond Electronics with Nitrogen Doped Ultrananocrystalline Diamond", J. E. Gerbi, B. W. Alphenaar, O. Auciello, J. Birrell, J. A. Carlisle, D.M. Gruen
- 2002 AVS Fall Meeting** "Electronic Structure of Nitrogen Doped Ultrananocrystalline Diamond", J. Birrell, O. Auciello, J. A. Carlisle, J. E. Gerbi, J. M Gibson, D. M. Gruen